Claims

[c1]   1. A laser annealing apparatus, adapted to perform a laser annealing process for annealing an amorphous silicon thin film, comprising:

a laser-generating module, adapted to provide a laser beam to recrystallize the amorphous silicon thin film to form a polysilicon thin film;

a resistance-measurement module, adapted to measure a sheet resistance of the polysilicon thin film for obtaining a sheet resistance value; and

a host circuit module, electrically coupled to and between the laser-generating module and the resistance-measurement module, the host circuit module, according to the sheet resistance value, outputting a feedback signal to the laser-generating module, for optimizing an energy density of the laser beam.

[c2]   2. The laser annealing apparatus of claim 1, further comprising a supporting module, wherein the supporting module is moveably located between the laser-generating module and the resistance-measurement module, adapted to support the amorphous silicon thin film, and electrically coupled to the host circuit module.

[c3]   3. The laser annealing apparatus of claim 1, wherein the laser-generating module comprises:

a laser beam source; and

a control circuit, electrically coupled to and between the laser beam source and the host circuit module.

[c4]   4. The laser annealing apparatus of claim 3, wherein the laser beam source comprises an excimer laser.

[c5]   5. The laser annealing apparatus of claim 1, wherein the resistance-measurement module comprises:

a measurement terminal; and

an output circuit, electrically coupled to and between the measurement terminal and the host circuit module.

[c6]   6. The laser annealing apparatus of claim 5, wherein the measurement terminal comprises a probe set.

[c7]   7. The laser annealing apparatus of claim 1, wherein the host circuit module is installed in a database, and the host circuit module is adapted to compare the sheet resistance with a plurality of referential resistance values stored in the database for generating the feedback signal.

[c8]   8. A laser annealing process, comprising:

(a) providing a laser beam to recrystallize one of a plu-

rality of amorphous silicon thin films to form a polysilicon thin film;

(b) measuring a sheet resistance of the polysilicon thin film for obtaining a sheet resistance value;

(c) comparing the sheet resistance value and a plurality of referential resistance values; and

(d) optimizing an energy density of the laser beam according to the comparison of the sheet resistance value and the referential resistance values.

[c9]   9. The laser annealing process of claim 8, after the step (d), further comprising:

(e) providing the optimized laser beam to recrystallize another one of the amorphous silicon thin films to form another polysilicon thin film.

[c10]   10. The laser annealing process of claim 9, after the step (e), further comprising repeating the steps (b) to (e) several times.

[c11]   11. The laser annealing process of claim 8, before the step (a), further comprising:

(f) individually providing the laser beam with different energy densities to a plurality of amorphous silicon thin film samples so as to recrystallize each amorphous silicon thin film sample to form a polysilicon thin film sample; and

(g) measuring sheet resistances of the polysilicon thin film samples, serving as the referential resistance values.